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REMARKS

In the Office Action, the Examiner objected to the title of the invention on the ground that it is not descriptive. Accordingly Applicant has amended the title of the invention in the substitute specification to read "SOLENOID VALVE HAVING A YOKE WITH YOKE PINS AND A CLAPPER ARMATURE" which Applicant believes sufficiently indicative of the subject matter of the invention.

The Examiner rejected Claims 1-2, 5-6, 8 and 9-14 under 35 U.S.C. 102(b) as being anticipated by the cited Schiel reference (U.S. Patent No. 4,840,193). Accordingly, Applicant has amended the claims to more clearly define the inventive features of the present invention. Especially, Applicant has clarified the structure of the solenoid valve of the present invention in Claim 1 in terms of the structural relationship between the coil and the valve housing, and the structural relationship between the yoke pins and the clapper armature. Applicant believes that the present invention is now clearly distinguishable from the technology disclosed in the cited Schiel reference.

Namely, the inventive features of the present invention reside in the fact that (1) the coil is wound around an outer surface of the valve housing, (2) the clapper armature is pivotally and magnetically connected with one of the yoke pins at one end thereof that is remote from the sealing element, and (3) another yoke pin engages with another end of the clapper armature that is proximal to the sealing element. All the features (1)-(3) are clearly shown

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in the drawings and described in the specification. None of the above features are disclosed in the cited Schiel reference.

For example, with respect to the feature (1), in the solenoid valve of the present invention, the coil is wound around the outer surface of the valve housing as shown in Fig. 1. In the cited Schiel reference, however, the magnet coil 3 is provided within the electromagnet, i.e., the electromagnet housing 1. As shown in the drawing of Schiel, the magnet coil 30 is installed within a space formed by the electromagnet 30, which makes difficult to manufacture when the solenoid valve has to be miniaturized. In contrast, in the present invention, since the coil 2 is mounted on the outer surface of the valve housing 1, the overall structure becomes simple and thus fine tolerance may not be required, which makes possible to produce the solenoid valves of very small size. As discussed above, the cited Schiel reference does not show or suggest the feature (1) of the present invention.

With respect to the feature (2), in the solenoid valve of the present invention, the clapper armature is pivotally and magnetically connected with one of the yoke pins at one end thereof that is remote from the sealing element. In the Office Action, it appears that the Examiner considers that the clapper armature of the present invention is identical to the actuator lever 18 of Schiel. Applicant respectfully disagrees with the Examiner's interpretation. As defined in Claim 1, the clapper armature in the solenoid valve of the present invention is a part of the

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electromagnet. Thus, the clapper armature is connected to the yoke (yoke pin) not only mechanically but also magnetically in such a way the magnetic resistance becomes minimum. The actuator lever 18 of the cited Schiel reference is clearly outside of the electromagnet and is not magnetically connected to the yoke (housing). Further, the actuator lever 18 is pivotally connected to the point of rotation 24 which is not the yoke because it is also separated from the electromagnet 30. As discussed above, the cited Schiel reference does not show or suggest the feature (2) of the present invention.

With respect to the feature (3), in the solenoid valve of the present invention, another yoke pin engages with another end of the clapper armature that is proximal to the sealing element. As discussed above with respect to the feature (2), since the actuator lever 18 is separated from the electromagnet because it is provided at outside of the electromagnet housing, it can never engage with the yoke pin of the present invention. Accordingly, the cited Schiel reference does not show or suggest the feature (3) of the present invention.

As discussed above, since none of the features of the present invention is shown or suggested by the cited Schiel reference, the present invention is not anticipated by Schiel. Therefore, Applicant believes that the rejection under 35 U.S.C. 102(b) is no longer applicable to the present invention.

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In the Office Action, the Examiner rejected Claim 3 under 35 U.S.C. 103(a) as being obvious over the cited Schiel reference in view of the cited Winter reference (U.S. Patent No. 5,791,339). It is stated that Winter teaches the construction of a spring piloted safety valve with jet venturi bias having a coil (40), which is wound directly onto the also unitary valve housing (23) for the purpose of providing a biasing force that urges the armature to the armature closed position.

As discussed with respect to the feature (1) of the present invention, the coil 2 is wound onto the outer surface of the valve housing 1. In the cited Winter reference, however, the coil 40 is wound around the inner yoke within a space formed by the safety valve 10. As shown in Figs. 1 and 2 of Winter, the coil is clearly shown within a space created in the valve housing which appears to be the same material with the yoke. Accordingly, the feature of the present invention defined in Claim 3 is not shown in the cited Winter reference.

Further, as discussed above, the present invention defined in Claim 1 is clearly distinguishable from the cited Schiel reference because none of the features (1)-(3) of the present invention are shown or suggested by Schiel. Claim 3 is dependent upon Claim 1 and defines the present invention with further specificities. Since the invention in Claim 1 is fully differentiated from the valve shown in the cited Schiel reference, the invention in Claim 3 is also distinguishable from the cited Schiel reference. Further

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as discussed above, the cited Winter reference does not show the essential feature of the invention defined in Claim 3. Accordingly, the present invention in Claim 3 is not obvious over the cited references taken singly or in combination.

In the Office Action, the Examiner rejected Claim 7 under 35 U.S.C. 103(a) as being obvious over the cited Schiel reference in view of the cited Nestler et al. reference (U.S. Patent No. 5,040,567). It is stated that Nestler et al. teaches the construction of a multi-way valve having an armature (38) being pressed onto the yoke corner by means of a spring (46) for the purpose of pressing the armature against the end region of the actuating member (20) in the vicinity of closing body (24).

As discussed above, the present invention defined in Claim 1 is clearly distinguishable from the cited Schiel reference because none of the features (1)-(3) of the present invention are shown or suggested by Schiel. Claim 7 is dependent upon Claim 1 and defines the present invention with further specificities. Since the invention in Claim 1 is clearly different from the valve shown in the cited Schiel reference, the invention in Claim 7 is also distinguishable from the cited Schiel reference. Accordingly, the present invention in Claim 7 is not obvious over the cited references taken singly or in combination.

In view of the foregoing, Applicant believes that Claims 1-14 are in condition for allowance, and accordingly, Applicant

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respectfully requests that the present application be allowed and passed to issue.

MARKED-UP VERSION SHOWING CHANGES MADE

IN THE ABSTRACT:

The abstract of the disclosure has been amended as follows:

A solenoid valve achieves high reliability and small size with fine tolerance. The [invention relates to a] solenoid valve having a valve housing, an electromagnet [, which has] composed of a coil, a yoke and a clapper armature [, and] having at least a first valve seat, and a sealing element which can be actuated by the clapper armature and which co-operates with the first valve seat. The yoke has yoke pins and the clapper armature is [arranged on a yoke pin] magnetically and pivotally connecting with one of the yoke pins at the end thereof that is remote from the sealing element.

IN THE SPECIFICATION:

Applicant has submitted herewith a substitute specification under 37 CFR 1.52(b) for providing section headings in accordance with the current U.S. practice and correcting minor informalities in the specification. The marked-up version of the specification

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is also submitted concurrently herewith. This is to verify that the substitute specification contains no new matter.

UN THE CLAIMS:

Claims 1-14 have been amended as follows:

1. (Amended) **[Solenoid valve having]** A solenoid valve comprising:

[-] a valve housing [(1),];

[-] an electromagnet[, which has -] comprised of a coil [(2),] wound around an outer surface of the valve housing, [-] a yoke [(3) -], and a clapper armature [(4), - and] having at least a first valve seat [(5)]; and

[- and] a sealing element [(6)] which can be actuated by the clapper armature and which co-operates with the first valve seat[,];

**[characterised in that]** wherein the yoke has yoke pins [(3.1, 3.2)] and the clapper armature [(4)] is **[arranged on a]** pivotally and magnetically connected with one of the yoke [pin (3.1) at the] pins at one end [(4.1)] thereof that is remote from the sealing element while another yoke pin engages with another end of the clapper armature that is proximal to the sealing element.

2. (Amended) **[Solenoid]** A solenoid valve according to claim 1, **[characterised in that]** wherein the valve housing [(1)] is formed in one piece.

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3. (Amended) **[Solenoid]** A solenoid valve according to claim 1, **[characterised in that]** wherein the coil [(2)] is wound directly onto the valve housing.

4. (Amended) **[Solenoid]** A solenoid valve according to claim 1, **[characterised in that]** wherein the clapper armature [(4)] is guided through the coil [(2)].

5. (Amended) **[Solenoid]** A solenoid valve according to claim 1, **[characterised in that]** wherein the clapper armature [(4)] is arranged in the fluid region.

6. (Amended) **[Solenoid]** A solenoid valve according to claim 1, **[characterised in that]** wherein the clapper armature [(4)] is of shell-like form in the region of the arrangement thereof on the yoke pin [(3.1)].

7. (Amended) **[Solenoid]** A solenoid valve according to claim 1, **[characterised in that]** wherein the clapper armature [(4)] is pressed onto the yoke pin [(3.1)] by means of a spring [(7)].

8. (Amended) **[Solenoid]** A solenoid valve according to claim 1, **[characterised in that]** wherein the first valve seat [(5)] is pressed into the valve housing [(1)] and, to compensate for manufacturing tolerances, the first valve seat is adjustable in terms of **[the]** relative position thereof to the clapper armature by pressing in the valve seat.

9. (Amended) **[Solenoid]** A solenoid valve according to claim 1, **[characterised in that]** wherein a first resilient element [(14)] is provided and acts on the sealing element [(6)] for **[the purpose**



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of a closure of] closing the first valve seat [(5)] by the sealing element.

10. (Amended) [Solenoid] A solenoid valve according to claim 1, [characterised in that] wherein a second resilient element [(15)] is provided and acts on the sealing element [(6)], which co-operates with the clapper armature [(4)], for [the purpose of a] raising [of] the sealing element from the first valve seat [(5)].

11. (Amended) [Solenoid] A solenoid valve according to claim 1, [characterised in that] wherein a first resilient element [(14)] is provided and acts on the sealing element [(6)] for [the purpose of a closure of] closing the first valve seat [(5)] by the sealing element, the first resilient element [(14)] and the electromagnet co-operating in such a manner that, when the electromagnet is excited, the sealing element [(6)] is lifted away from the first valve seat [(5)] and, when the electromagnet is not excited, the sealing element comes into closing contact with the first valve seat [(5)] owing to the force of the first resilient element [(14)].

12. (Amended) [Solenoid] A solenoid valve according to [any one or more of the preceding claims] claim 1, [characterised in that] wherein a second valve seat [(13)] is provided and co-operates with [a] the sealing element [(6)] which can be actuated by the clapper armature [(4)].

13. (Amended) [Solenoid] A solenoid valve according to [any one or more of the preceding claims] claim 1, [characterised in

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that] wherein two valve seats [(5, 13)] which are pressed into the valve housing [(1)] are provided, the sealing element [(6)] which can be actuated by the clapper armature being arranged between the two valve seats and the relative position of the valve seats to each other and to the clapper armature being adjustable by pressing in the valve seats.

14. (Amended) [Solenoid] A solenoid valve according to claim 1, [characterised in that] wherein

[-] a first resilient element [(14)] is provided and acts on the sealing element [(6)] for [the purpose of a closure of] closing the first valve seat [(5)] by the sealing element,

[-] the first resilient element [(14)] and the electromagnet co-operate in such a manner that, when the electromagnet is excited, the sealing element [(6)] is lifted away from the first valve seat [(5)] and, when the electromagnet is not excited, the sealing element comes into closing contact with the first valve seat [(5)] owing to [the] force of the first resilient element [(14)],

[-] a second valve seat [(13)] is provided and co-operates with [a] the sealing element [(6)] which can be actuated by the clapper armature [(4)], and

[-] the first and the second resilient element [(14, 15)] and the electromagnet co-operate in such a manner that, when the electromagnet is excited, the force of the first resilient element [(14)] is counteracted by the clapper armature [(4)]

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and the sealing element [(6)] is moved into closing contact with the second valve seat [(13)] owing to [the] force of the second resilient element [(15)] and, when the electromagnet is not excited, the sealing element [(6)] comes into closing contact with the first valve seat [(5)] owing to the force of the first resilient element [(14)].

Respectfully submitted,

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